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CHARAXES EUDOXUS DRURY (LEP.). A REVISION, WITH DESCRIPTION OF A NEW SUBSPECIES

By G. D. Hale Carpenter, D.M.

(*Hope Professor of Zoology (Entomology) in the University of Oxford.*)

[Read 18th November, 1936.]

With Plates 1 to 5.

Charaxes eudoxus is a West African species with a range through the Belgian Congo into Uganda, the southern Sudan, and the western part of Kenya Colony in the neighbourhood of Mt. Elgon and the east side of Lake Victoria. Generally believed to be rare, it is not so uncommon in Katanga and the Mt. Elgon locality. The females of *eudoxus* are little known, and the opportunity is here taken of figuring and describing each form, except *theresae* Le Cerf, which is only known by three males. A new form has been taken by Mr. T. H. E. Jackson, F.R.E.S., at Katera, in the forest on the Buddu (west) coast of L. Victoria, which is described in this paper: to him and to Dr. V. G. L. van Someren of Nairobi I am greatly indebted for specimens and information.

An effort has been made, with the aid of the *Zoological Record*, to obtain every published reference to the species, and I am greatly indebted to Lord Rothschild, F.R.S., and Mr. J. Levick for allowing me to study the specimens in their collections.

All the specimens in the National collection and in the Hope Department of Entomology at Oxford have been examined also, and the following notes embody the results from 81 males (including Drury's figure) and 16 females.

I am greatly indebted to Mr. Levick for his loan of the fine specimen of the *mechowi* female which is here figured, and to the Keeper of Entomology, British Museum (Natural History), for permission to photograph a female from Angola, and to make a preparation of the genitalia of *Charaxes fallax* Rich. for comparison with those of *eudoxus* forms.

Mr. F. J. Griffin, Registrar of the Royal Entomological Society, very kindly wrote a note on a bibliographical matter which is appended, and also helped by translating German papers.

Males.

1. *Charaxes eudoxus eudoxus* Drury, 1782.

This, the nominotypical form, is much the rarest, and seems to be best known from Sierra Leone, whence came the original specimen, figured by Drury (1782). There is in the National collection one male, and in the Oxford University Museum one male and one female, from Sierra Leone. Rothschild and Jordan (1900) note that there is "a male from Buea, Cameroons, in Dr. Staudinger's collection; a specimen from Aburi, Ashanti, in the Senkenbergische Museum at Frankfort-on-the-Maine." There is also a male at

Oxford without locality data. Holland (1920) notes "three males which I refer to this species. They were taken at Medje . . ." : he alludes to *mechowi* as a separate species. Medje is described as "a point near the Nepoko River in the very heart of the forest." The distinguishing feature of this form is the large size and slightly paler, or more yellowish, colour of the orange rufous band of the fore-wing which extends forwards into area 7 where it is well marked, and is broader than in other forms. On the under surface of the hind-wing all specimens I have seen agree with the figures given by Drury (1782) and Jones (1785) in showing a pronounced black centre to the silver streak which crosses the wing from the anterior margin just external to the precostal vein and anterior to the subcostal vein before it branches. Posterior to the subcostal vein this streak may have a black centre in the other forms, but not anteriorly to the subcostal vein. Holland (1920) distinguishes his three specimens from *mechowi* by "the great reduction in width of the silvery bands on the lower surface of the hind-wings." This is not apparent in the three *e. eudoxus* which I have seen. Possibly Holland's specimens are tending towards the aberration *amaurus* (vide infra).

A feature of *e. eudoxus* also seems to be that on the under surface of the fore-wing the two large silver-bordered black spots in area 2, distal to the cell, approach each other posteriorly very nearly, or may even fuse posteriorly as in the male specimen at Oxford captured by Lieutenant Foster, in which they form a comma-shaped patch with its back directed posteriorly and head to the right, the tail extending forwards into the base of area 3. In the female captured by him the spots are only separated posteriorly by the silver borders which have fused, and in the male from an unknown locality the silver borders just fail to touch. (Pl. 1, fig. 1; pl. 2, fig. 1A.) Drury's figure shows them in the least approximated position.

The large black patch on the underside of the hind-wing in area 1*b*, shown on the left in Drury's figure 4, is of variable appearance: it is produced by the fusion of two spots anteriorly, which sometimes are fused throughout their length. Occasionally incomplete fusion is shown by an area of brownish scales in the centre of the black, and, rarely, the two spots may be discrete. But the appearance of this patch is not a good character by which to separate forms.

Measurements of the bands on the upper surface of the wings were made at definite spots to provide a standard for comparison between the various forms.

The points chosen were as follows: measurements in millimetres.

*A*1. Breadth of orange band along vein 1 of f.w.
*A*2. „ „ „ „ „ vein 2 of f.w.
*B*1. „ „ „ „ „ vein 7 of h.w.
*B*2. „ „ black submarginal band along vein 5 of h.w.

A little difficulty is introduced by a tendency for the orange scales to penetrate into the black along the veins, giving an irregular edge to the black. In such a case if there is a well-marked indentation just along the vein, the points of the measurer were placed at what was judged to be the edge of the black if it had not been indented by the orange along the vein. Similarly, the margin of the black band on the hind-wing is apt to be a little irregular and allowance has to be made.

The following are the measurements at the points indicated in Drury's figure, the two males at Oxford, and one in the National collection.

	*A*1.	*A*2.	*B*1.	*B*2.
Drury.	8	6	6·5	5
Foster's specimen . . .	7·5	6	6	4·5
No data	7	5	5	4·5
Brit. Mus. specimen . . .	7·5	6	6	4·5
Means	7·5	5·7	5·9	4·6
Maxima	8	6	6·5	5
Minima	7	5	5	4·5

A puzzling point obtruded itself in connection with early references to this form. Drury's work, published in 1782, contains in the Index the following reference: "Plate 33, Figs. 1, 4. Eudoxus. A variety of Castor. Fab. Mant. P 251." Now the *Mantissa* was not published until 1787. I sought the help of Mr. F. J. Griffin, Registrar of the Royal Entomological Society, for an explanation of this anomaly, and he kindly wrote as follows:—

"17th July, 1936.

"Drury's book was certainly published in 1782, and Fabricius' equally certainly in 1787. It is therefore most unlikely that Drury could possibly quote a page or species number reference to Fabricius' book. The only work of Fabricius to which I think a reference could have been made is his *Syst. Ent.* 1775, but in this work I can find no reference either to the species *castor* or *eudoxus*. In my opinion the reference in Drury to Fabricius is a 'ghost.'

"I am led to this conclusion by Drury's remark on page iv of his preface in which he says 'the truth is the descriptions were made about the year 1775. . . .'

"According to Weiss, 1927, *Ent. News*, **38** : 209, Drury first met Fabricius in 1767, Fabricius being then in London, and from 1772–1775, when Fabricius spent his summers in London, Drury frequently met him. It seems, therefore, that Drury had certain specimens in his collection named either *castor* or *eudoxus*, and to his knowledge Fabricius made notes with regard to these specimens. Probably Drury was under the impression that Fabricius had published remarks concerning these specimens, and this is the more likely since in his preface referred to above he complains of the action of entomologists who, while receiving his hospitality, abused this by publishing his (Drury's) names in advance of his own work. This complaint is made when he speaks of the long delay in the publication of Volume 3 of his *Illust. Nat. Hist.*, the work with which all the Drury references given above are concerned."

2. *C. eudoxus mechowi* Rothschild, 1899.

Described from northern Angola: also known from Cameroons (Holland, 1920; Schultze, 1916, 1917) and the Congo as far as Katanga and the Semliki river (Rebel, 1914; Poulton, 1929). The orange-rufous band of the fore-wing decreases rapidly from the inner margin forwards and, according to Rothschild and Jordan who published the first written description in 1900, stops at vein SC 5 (= 7). The black submarginal band of the hind-wing is typically narrower than the admarginal band, and thus narrower than in *e. eudoxus*: it tapers strongly posteriorly. Thus the marginal tawny border is broader than in *e. eudoxus* or *e. cabacus*. It is difficult to find a character of the *under* surface by which to distinguish *mechowi* from *eudoxus*: the two males of the latter at Oxford are not alike in the character of the black markings in area 1*b* on the fore-wing, for in the specimen without data the two spots have

not fused, though posteriorly they are nearer together than in *mechowi*. There seems to be one feature, however, by which *mechowi* and all other forms differ from *eudoxus*: the black centre to the discal silver streak present in *eudoxus* anteriorly to the subcostal vein, in *mechowi* and others is absent, as well as in *Ch. fallax* Richelmann. Pl. 1, fig. 2; pl. 2, fig. 2A.

Neave (1904) described a specimen from the Tiriki Hills, Kenya Colony, as belonging to this form. This specimen, however, is in reality of the form *cabacus* described by Jordan (1925).

The race *mechowi* extends eastwards into southern Sudan. A specimen in the possession of Captain I. G. Owen of the Sudan Defence Force, who kindly let me examine it, was taken by him on the western border of the south of Bahr-el-Ghazal, near the French border, on 16 April, 1936, at Bendi, about forty miles south-west of Yambio. Still more interesting is a specimen in the National collection captured by Major F. Moysey in Mongalla Province, on the Imatong mountains lying along the Sudan–Uganda frontier, in 1930. This specimen, belonging to the Congo race *mechowi* and not the East African race *cabacus*, exemplifies again the *West* African character of the fauna of the South Sudan to which I have previously drawn attention (1935). Both the Sudan specimens are of the aberration *amaurus* Poult. (vide infra).

I am unable to confirm that in *mechowi* the silvery markings are generally less than in *eudoxus*, nor do I agree with the view of Schultze (1916) that *eudoxus* is nearer to *fallax* than is *mechowi*. The great breadth of the band on the fore-wing, and the black centre to the silver streak on the underside of the hind-wing in *eudoxus*, contradict this. Moreover, the male genitalia are alike in *eudoxus* and *mechowi* and both equally different from those of *fallax*. Schultze (1917) criticises Drury's figure as being like a caricature, and therefore is uncertain whether it represents *eudoxus* or *mechowi*. This is unnecessary: the breadth of the fore-wing band is that of *eudoxus* from Sierra Leone, and not at all like Rothschild's figure of *mechowi* (1899), or Oberthür's figure (1912) of the same form which, as Rebel (1914) and Lathy (1925) point out, was quite unnecessarily re-named "*blachieri*" by Oberthür (1912).

Schultze mentions as characteristic of *eudoxus*, as contrasted with *mechowi*, a fine network of silver over the red-brown base of the under surface: no such distinction is apparent in the specimens which I have been able to see.

Holland (1920) points out that the figure given by Aurivillius *in* Seitz (1911) lacks the strong black submarginal markings in areas 1*a*, 1*b*, on the underside of the fore-wing. It is in many respects an unsatisfactory figure. Holland, apparently following Aurivillius' description of the plate, separates *mechowi* as a species distinct from *eudoxus*.

The width of the rufous-orange band of the fore-wing and of the rufous-orange and black bands of the hind-wing, on the upperside, enables *mechowi* to be distinguished from the next form *cabacus*, which comes nearest to it. The following are the measurements, as in *eudoxus*.

	*A*1.	*A*2.	*B*1.	*B*2.
Type specimen from Angola in Mr. Levick's collection .	5	3	6	2
18 specimens from Cameroons (Bitje, Ja river, and Sakbayeme district), mean of the whole . . .	5·1	2·4	5·2	2·4
Maxima	7	3·5	7	3
Minima	4	1·5	4	1·5

Another set of 23 specimens is grouped together as follows: Central Belgian Congo and French Congo 10, Katanga and other places in Eastern Congo 13.

	*A*1.	*A*2.	*B*1.	*B*2.
Mean	5·2	2·6	5·3	2·7
Maxima	7	4	6	4
Minima	3·5	2	4	1
Mean for the whole 42 specimens . . .	5·2	2·5	5	2·5
Maxima „ „ „ „ . . .	7	4	7	4
Minima „ „ „ „ . . .	3·5	1·5	4	1
Two specimens from the Sudan { Bendi . .	7	4·5	6·5	2·5
{ Imatong .	5	3	6·5	2

The characteristic anterior narrowing of the orange-red band on the front wing, and the posterior narrowing of the black band on the hind-wing, are clearly shown.

3. *C. eudoxus cabacus* Jordan, 1925.

This was described as differing from *mechowi* by having " on the upper-side the tawny post-discal band of the fore-wing much narrower " and on the hind-wing " the tawny discal band likewise narrower than in *Ch. e. mechowi*, and the black submarginal band broader." The tawny band is darker than in *eudoxus*, agreeing in this with *mechowi*: the larger and better-defined basal tawny area of the fore-wing is also different in *cabacus* and *mechowi* from that of *eudoxus*. Pl. 1, fig. 3; pl. 2, fig. 3A.

The type came from Entebbe, Uganda, on the north shore of Lake Victoria, and the following are the measurements for this and eight other specimens from the same neighbourhood.

	*A*1.	*A*2.	*B*1.	*B*2.
Type	5	3	5	3
Mean for nine specimens . . .	4·3	2·5	4	4·9
Maxima „ „ . . .	6	4	6	6
Minima „ „ . . .	2·5	1·5	3	3·5

According to van Someren (1936, 181) " this race extends [from Uganda, central] eastwards to Elgon, Kitale, Cherangani, and the Mau." The following are the measurements in fifteen specimens from the eastern area, including the Yala river and Tiriki Hills.

	*A*1.	*A*2.	*B*1.	*B*2.
Mean for fifteen specimens . . .	5·8	3·5	5·7	4·2
Maxima „ „ . . .	7	4	8·5	5
Minima „ „ . . .	5	2·5	4·5	3

It will be seen that in the Entebbe neighbourhood the fore-wing band is narrower than in the eastern examples, in which the anterior end is noticeably larger, so that in this respect the eastern examples differ more from *mechowi* which has the band much less marked anteriorly, though it is broader posteriorly than in most *cabacus* from the type locality. It is interesting that there should be this difference between eastern *cabacus* and those from the more western locality of the type; some of the latter come quite near to the new subspecies described below as *katerae* from a locality further west, on the west coast of the northern part of Lake Victoria.

If the tables be compared with those for *mechowi*, the posterior narrowing of the submarginal black band on the hind-wing of the latter is evident.

4. *C. eudoxus cabacus* ab. *amaurus* Poulton, 1929 (= *eudoxus amaurus*).

This was differentiated by the " dimming of the characteristic silvery pattern of the under surface in other races of *eudoxus*." The type, and female

allotype, in the University Museum at Oxford, came from Kenya Colony, Kitale, on the south-east lower slopes of Mt. Elgon. Allusion is made to another specimen captured at Kamwezi and described by Neave (1904) as a form of *mechowi* in which " the silvery marking of the underside has entirely disappeared, and is only partly replaced by a dull slate-colour." This is the maximal development of this aberration. The markings of the upper surface do not appreciably differ from those of specimens of normal *cabacus* from the same area, but it is interesting that no specimens of the aberration *amaurus* have yet been seen from the Entebbe neighbourhood. Pl. 1, fig. 4; pl. 2, fig. 4A.

The following are the measurements in seven specimens of the aberration, all from the Elgon neighbourhood.

	*A*1.	*A*2.	*B*1.	*B*2.
Type	5·5	4	5	4
Mean, of seven . . .	5·3	3·8	5·8	4·3
Maxima	6	4	7·5	5
Minima	5	3·5	5	3·5

The form *amaurus* can no longer be regarded as a geographical race; it appears to be an alternative of the under surface which occurs in other races as well as in *cabacus* (*e.g.* the Sudan *mechowi* mentioned above, and the race *katerae* described below). It would be most interesting to ascertain whether it ever occurs in *e. eudoxus* of the West Coast. (Vide supra under *e. eudoxus*.)

The question of *amaurus* as a race distinct from *cabacus* was considered by van Someren (1936, 182); he " bred a series of both from the same locality, and it would appear that *amaurus* is a variety and not a geographical race." The life-history is described and " the early stages appear to be identical, or almost so." The pupa of *amaurus* according to the description has " a yellowish streak on the edge of the wing-cases and spots of the same colour on the head " which are apparently not present in *cabacus*.

5. *C. eudoxus theresae* Le Cerf, 1932.

This was described from a single male, taken at Kitembo, Lake Kivu: it was considered to be intermediate between *mechowi* and *cabacus*. In the holotype (pl. 5, fig. 1) the chestnut basal area of the fore-wing extends to the discocellular. The character of the postmedian band is peculiar: very wide at the base (" 8 mm. entre 1–2 ") it very rapidly decreases to 2 mm. behind nerve 3, which it does not reach. Beyond nerve 3 there are three spots, of which the last is minute. Marginal spots smaller than in *mechowi* or *cabacus*.

The orange band of the hind-wing measures 10 mm. on nerve 5, and 6·5 mm. on nerve 7, above which it expands strongly towards the base of the wing forming a long point reaching to the base of nerve 8. The post-discal black band measures 8 mm. from nerve 8 to nerve 6, and is narrower between 6 and 2, measuring 4 mm. between 3 and 2.

Since this description Monsieur Le Cerf has received two other specimens from Lake Kivu, and through his great kindness I am able to reproduce, from negatives sent by him, photographs of the holotype and one of the later specimens, differing slightly. (Pl. 5.)

The great basal width of the band on the fore-wing, coupled with its very rapid diminution anteriorly, indicate that *theresae* is nearer to *mechowi* than to *cabacus*: this would be expected from the locality, of which Monsieur Le Cerf wrote to me that it is " un centre faunistique bien différent de ceux du Kenya Territoire." It will be noted that in one specimen (pl. 5, fig. 2) the character

of the black band of the hind-wing is quite analogous to that of *mechowi*, but in the holotype and the other specimen it does not show the rapid narrowing posteriorly. The under surface of *theresae* is like that of *mechowi*. This form is obviously transitional from *mechowi* towards the form described in the next section as *katerae* subsp. n. and the locality is geographically intermediate between the habitats of *mechowi* and *katerae*. No females have yet been taken which can be ascribed to *theresae*.

6. **Charaxes eudoxus katerae** subsp. n.

The type and the two other specimens mentioned below were collected by Mr. T. H. E. Jackson at Katera in 1935, in the Malabigambo forest on the Buddu (west) coast of Lake Victoria. This race is characterised by a much greater reduction of the tawny band on the upper surface of the fore-wing so that it is only faintly shown in areas 1*a*, 1*b*, and 2, and can with difficulty be seen to be represented anteriorly by a few scales. The submarginal black band of the hind-wing is large, and not so tapering posteriorly as in *mechowi*; the tawny band of the hind-wing is narrowed and partly suffused with black so as to be darkened. Expanse of fore-wings 67 millimetres. Pl. 1, fig. 5.

Two of the specimens are of the aberration *amaurus*, the silver markings on the under surface being replaced by dull grey; in one specimen they are reduced more than in the other. In the type the silver on the under surface is as brilliant as in *e. eudoxus*; the black centre is lacking in front of the subcostal vein as in all other forms except *e. eudoxus*. In the relative position of the two large black spots on the underside of the hind-wing in area 2 *katerae* resembles other forms of the species except *e. eudoxus*—that is, they do not meet posteriorly. Pl. 2, fig. 5A.

This form greatly resembles *Charaxes fallax* Richelmann in general appearance. Its rather smaller size, less concave outer margin of the fore-wings, intense, almost bluish, deep brownish-black ground-colour, and the darker tawny-orange markings on the upperside, conduce to this resemblance. But the post-discal band on the f.w. is represented in *fallax* by a series of markings of almost equal width from areas 1*a* to 6 inclusive, more clearly divided from each other, whereas in *katerae* the markings taper to a scarcely visible mark in area 2, beyond which they are not continued in the type. In the two specimens of aberration *amaurus* there is just visible a trace of dark orange in areas 3 and 4. The tawny-orange band on the hind-wing is not quite so narrow as in *fallax*, and at the anal angle in *fallax* the blue spots are much less developed than in forms of *eudoxus*. Pl. 1, fig. 6; pl. 2, fig. 6A.

The width of the bands is as follows:—

	*A*1.	*A*2.	*B*1.	*B*2.
katerae type	2·5	not perceptible	4·5	8·5
„ ab. *amaurus*	2	1	4	6
„ „ „	2	1	2·5	5·5
fallax (figured)	3·5	2	2·5	5·5
Means of seven other specimens in B.M. .	3·6	2·5	4·3	4·7
Maxima „ „ „ „ „ .	4·5	3	6	6
Minima „ „ „ „ „ .	3	2	2·5	3·5

It will be seen that on the fore-wing the post-discal orange band is more reduced in *katerae* than in *fallax*. The under surface has several features by which *katerae* can be distinguished from *fallax*. The two large spots in area 2

are some distance apart, as in other forms of the species except *e. eudoxus*, whereas in *fallax* they are contiguous. In area 3 there is a large black spot which in *fallax* is in the middle of the distance between the base of the area and the wavy silvery line which runs back from the costa, delimiting a much darker basal portion of the wing (seen well in fig. 6A). In *katerae*, as in all other forms of the species *eudoxus*, this spot lies more distally and touches the end of the pale line which is much less silvered than in *fallax*. Distally to this silvered line there is in *fallax* a distinct black mark edged with silver distally in each of areas 4, 5, 6, 7, continuing forwards the series commencing in 1*a*. These black marks are not shown in forms of *eudoxus* in areas 4, 5, 6, 7, and the silver edges are represented by rather indefinite and irregular pale zigzag lines (see pl. 2). The under surface of the hind-wing in *fallax* has the silver streaks finer and narrower than in forms of *eudoxus*. There are three main silver streaks crossing the wing from the costa backwards, of which the proximal is just external to the precostal vein. The other two may be bent towards each other so that they are contiguous in their middle part (as in the figure of *katerae*) or they may not touch (as in the figure of *mechowi*). In *fallax* they are very wide apart, and the distal one is much finer than in any form of *eudoxus*.

This new race *katerae* was first mentioned and figured by van Someren (1936 : 183–4, pls. 22, 23) but no name was given to it, pending the present revision : he drew attention to the occurrence of specimens without the silver markings on the underside.

The general dark tints of *katerae*, with the almost bluish tint in the dark brown, produce considerable resemblance to *Ch. lucretius* Cr.; the lack of silver on the underside of the aberration *amaurus* greatly aids this resemblance. The female of *katerae*, as will be seen, has an astonishing resemblance to that of *lucretius*.

Females.

It now remains to consider the females of *Charaxes eudoxus*.

Aurivillius (1894) mentioned the female as like the male.

Rothschild and Jordan (1900 : 419) describe the female of *e. eudoxus* as " Essentially like ♂, tawny band of fore-wing, above, wider " : the female of *e. mechowi* is " not known."

A short description of the female of *e. cabecus* (sic) is given by van Someren (1929 : 175), and the female of the new form, unnamed at that time, was described, with two plates, in 1936 (p. 184). The female of Poulton's *amaurus* was described by him in 1929.

1. *C. eudoxus eudoxus.*

The specimen figured is taken as the neallotype. It is in the Hope Department of Entomology in the Oxford University Museum, and was captured in 1910 at Regent, about three miles south-east of Freetown, Sierra Leone, by the late Lieutenant Chas. A. Foster, whose father generously gave it, among many other valuable specimens, to the University.

The general appearance is sufficiently well illustrated by the figures : the colour of the paler areas above is considerably lighter than in the male. The expanse of wings, between the broadest part of the fore-wings at vein 7, is 85 mm. Pl. 3, fig. 7 ; pl. 4, fig. 7A.

Measurements in the same manner as for the males give—

	*A*1.	*A*2.	*B*1.	*B*2.
Neallotype . . .	8	7	6·5	8

The under surface has the same characteristics as that of the male: the silver bars on the hind-wing anteriorly have black centres, and the two large black spots in area 2 are posteriorly very near together, though they do not fuse as in the male.

2. *C. eudoxus mechowi.*

The neallotype is taken as the specimen in the collection of Mr. John Levick of Handsworth Wood, Birmingham, who generously sent it for photography (pl. 3, fig. 9, and pl. 4, fig. 9A). It bears data as follows: "Katanga, Congo B., Kangazi. Coll. Le Moult."

The differences from *e. eudoxus* are the same as in the male: the black admarginal band of the hind-wing rapidly tapers posteriorly, and the marginal tawny border is broader than in *eudoxus*: its black outer edge is narrower so that the centres of the tails are tawny instead of being filled with black as in *eudoxus*. The marginal tawny spots on the fore-wing are larger than in *eudoxus*, and form a band only broken by the black ends of the veins. The black portion of the fore-wing between the tawny band and the basal area, the latter being darker red-brown than the band, is more sharply defined from the basal area, and is without the ill-defined red-brown spots present in *eudoxus* at the end of the cell and at the bases of areas 6 and 7.

The under surface differs from that of *eudoxus* as in the male. The faint trace of black in the centre of the anterior part of the silver streak just external to the precostal vein is rather exaggerated by the photograph. The separation of the two large spots in area 2 is well seen. Expanse of wing 82 mm.

There is a somewhat damaged female in the National collection, formerly in the possession of Mr. Grose-Smith, from whom it was acquired by the late Mr. Joicey: the only datum it bears is "Angola." It agrees with other specimens of *mechowi* here mentioned; on the under surface the silver streak external to the precostal vein of the hind-wing has no trace of silver until that part within the posterior half of the cell. The two spots in area 1*b* of the fore-wing form one solid, almost quadrangular, mass, and the two in area 2 are brought closer together by the enlargement of the outermost which, nearly spherical, is only separated from the inner one by their silver borders. These points are clearly shown in pl. 4, fig. 8A.

Measurements of available specimens give the following results.

	*A*1.	*A*2.	*B*1.	*B*2.
1. Neallotype	8	6	6·5	6
2. Also in Mr. Levick's colln., data as 1 . .	9	6	7	3·5
3. " " " " " , Katanga, Kangazi .	7	6	5·3	3
4. Lord Rothschild's colln., " " .	8	5·5	6	5
5. National collection, "Angola" . . .	9	6	6	3·5
Mean	8·2	5·9	6·2	4·2
Maxima	9	6	7	6
Minima	7	5·5	5·3	3

It will be seen that the specimen selected as the neallotype does not exemplify so markedly as do some of the others the sudden narrowing posteriorly of the black admarginal band of the hind-wing.

3. *C. eudoxus cabacus.*

The female of this race was not known to Jordan when he described the male. A brief description under the name "*cabecus*" was published by van Someren (1929). This must be looked upon as the original description of the female, but unfortunately no type specimen was designated, nor were exact data of locality given for the allotype. The female specimens which I have seen all come from the neighbourhood of Kitale, on the south-east slopes of Mt. Elgon.

As the publication is not everywhere accessible this first description is here reproduced.

"*Charaxes eudoxus cabecus*, [sic] Jord.

FEMALE: Very like the male but the fore and hind ala[r] bars are wider and of a paler orange, the spots in the fore-wing being more pronounced and expanded laterally. The marginal spots of both fore- and hind-wings larger and paler. The underside has a paler chestnut ground-colour but the distribution of the markings is as in the male, though less silvery."

This description was later (1936) augmented, and a figure given, which must be considered to represent the allotype. It is unfortunate that this figure shows an approach to *mechowi* in the rather sudden narrowing posteriorly of the black admarginal band on the hind-wing: this is not shown in the figure now given (pl. 3, fig. 10) nor in six other females kindly lent for study by Dr. van Someren. The female of *cabacus* differs from that of *eudoxus* by the narrower black margin to the hind-wing and broader orange band immediately internal to it: thus (as in *mechowi*) the bases of the tails are orange instead of black. The black post-discal band of the hind-wing does not suddenly taper posteriorly, thus agreeing with *eudoxus* and differing from *mechowi*. The fore-wing differs markedly from that of *mechowi* in the breaking up of the black beyond the cell by orange spots in the bases of areas 4, 5, and 6, and again more distally in the same areas: this is the case to a greater degree in the figure given by van Someren than in the one illustrating this paper. These spots are faintly indicated in *eudoxus* but absent from *mechowi*.

The following are the measurements for four specimens of typical female *cabacus* which I have been able to see through the kindness of Dr. van Someren and Mr. T. H. E. Jackson.

	*A*1.	*A*2.	*B*1.	*B*2.
Means	8·1	6·4	7·1	5·6
Maxima	9	7	9	7
Minima	7	5·5	6·5	5

4. *C. eudoxus cabacus* ab. *amaurus.*

This can no longer be considered as a race, but only as an aberration which may occur in *cabacus*, and also in *mechowi* and *katerae*.

The allotype of *amaurus* described by Poulton (1929) is shown on pl. 3, fig. 11. As in the case of the respective males, there is no difference of importance between *amaurus* and typical *cabacus* on the upperside.

Measurements give the following values.

	*A*1.	*A*2.	*B*1.	*B*2.
Allotype	8·5	7·5	7	6
Means for three others from Kitale . .	7	5·3	6·2	6·2
Maxima „ „ „ „ . .	7	7	7	6·5
Minima „ „ „ „ . .	7	5	5	5·5

In the extreme form of *amaurus*, shown in Poulton's female allotype (pl. 4, fig. 11A) and one of the specimens which Dr. van Someren kindly lent me, as Poulton described (1929, 478): "the suppression of the markings is carried further than in the male, especially in H.W., where a close inspection is required in order to detect the fine grey line which occupies the position of the basal stripe and the slight traces indicating in part the position of the silvery markings crossing the centre of the wing in *cabacus*."

This uniform under surface produces a considerable resemblance, as Poulton pointed out, to the female of *lucretius* Cram., but the *upper* surface has departed little from that of typical *amaurus*. The figures given above seem to indicate that a slight narrowing of the orange bands on the wings has begun; a process carried much further in the next subspecies (*katerae*) to produce an astonishing resemblance to *lucretius*.

The development of the silver streaks in the female of even typical *cabacus* is not so great as in *eudoxus* and *mechowi*. It remains to be seen whether *katerae* occurs in the form *amaurus* in the female sex: the only two specimens known at present have the silver well developed.

5. **Charaxes eudoxus katerae** subsp. n.

The female of the form here named was described and figured by van Someren (1936) as a new subspecies, but he gave it no name. The paratype here figured (pl. 3, fig. 12; pl. 4, fig. 12A) was captured by Mr. T. H. E. Jackson in October, 1935, in the Katera forest (part of the Malabigambo forest) on the west coast of Lake Victoria, Buddu, Uganda. The allotype in the National collection differs slightly from the figure by the bands on the hind-wing. It was captured in the same forest as those taken by Mr. Jackson, by Dr. S. A. Neave in September, 1911.

The appearance, well shown by the figures, is, as van Someren pointed out (*loc. cit.*), very like that of the female of *Charaxes lucretius* Cr., which flies with it in the same locality. This resemblance is due to a darkening of the fore-wing, nearly the whole of which is of a very deep blackish-brown, the basal tawny-orange area being greatly reduced so that it only extends over half of the cell, but leaves a well-marked tawny-orange spot at the end of the cell; to a similar darkening on the hind-wing and broadening of the black post-discal band; and to a narrowing of the pale bands crossing both wings which are of a lighter shade than in other forms of *eudoxus*. The marginal spots on the fore-wings are as small as in *e. eudoxus*; the marginal lunules of the hind-wings are distinctly separated from each other by the black ends of the veins which aid the resemblance to *lucretius*; for in other forms of *eudoxus* the lunules tend to form a continuous band by reduction of the black on the intervening veins. The conspicuous tawny-orange spot on the fore-wing at the end of the cell is matched by a similar marking in *lucretius* which, however, has the proximal half of the costal area more strongly tawny-orange than *katerae*.

The following are the measurements of the discal spots, and the black band on the hind-wing, as before.

	*A*1.	*A*2.	*B*1.	*B*2.
Paratype . . .	5	4	4	8·5
Allotype	5	4	6	6·5

The under surface is conspicuously different from that of *lucretius*, owing to the characteristic silver streaks: there is no essential difference from that

of *cabacus* (see figs. 10A, 12A). No *amaurus* aberration of the female *katerae* is yet known: it would immensely enhance the likeness to *lucretius*. The two large spots in area 1*b* of the fore-wing are in *katerae* fused into one blotch, which is their usual state, whereas in the specimen of *cabacus* female illustrated they are, rather unusually, completely distinct. In the three other *cabacus* females examined, and in the four *amaurus* females they are more or less fused.

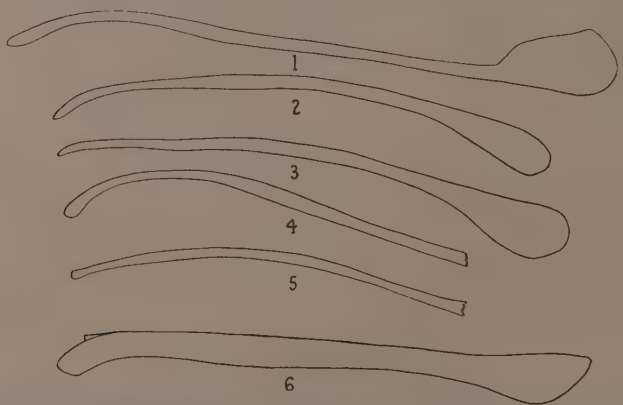
The male genitalia.

Talbot (in Poulton, 1929: 479–80) drew attention to the differences between the genitalia of *eudoxus* forms and *fallax*.

I can entirely endorse his statement that the aedeagus of *fallax* is specifically different from that of *eudoxus*. It is much broader in proportion to its length and has a conspicuous spine, as will be seen from the figure.

I have been unable to examine genitalia of *e. eudoxus*, but have made preparations from 10 specimens of other races, and give drawings which show that those named in this paper, except *theresae* which I have not examined, are undoubtedly conspecific. There are no adequate grounds for separating *mechowi* from *eudoxus* (Holland, 1920), or for Schultze's view (1916) that *eudoxus* is nearer to *fallax* than is *mechowi*. The basal extremity in both specimens of *katerae* is unfortunately missing, but the proportions of the greater part are as in other races of *eudoxus*.

The differences mentioned by Talbot in the apical part of the clasper are of doubtful validity. It is difficult to make sure that a structure of which part is bent at an angle is always seen in the same fashion when drawn under the microscope; and the degree of chitinisation seems to me to vary greatly.



FIGS. 1–6.—The aedeagus of *Charaxes eudoxus* and *C. fallax*.—1. *C. eudoxus mechowi*, the figured specimen; 2. *C. e. cabacus*, the figured specimen; 3. *C. e. c.* ab. *amaurus*, holotype; 4. *C. e. katerae*, holotype; 5. *C. e. k.* ab. *amaurus*, holotype; 6. *C. fallax*, the figured specimen.

It seems possible, from the foregoing data, to distinguish the following races of *Charaxes eudoxus*:

1. *eudoxus*. The most westerly; known from Sierra Leone, Ashanti, Buea (Cameroons); and "Medje, near the Nepoko river in the very heart of the forest," Congo Belge.

2. *mechowi.* Known from northern Angola and the Belgian Congo including Katanga and other parts of the eastern Belgian Congo as far as the Semliki river. One specimen is known from the mountains on the Sudan–Uganda border in Mongalla Province, another from the Sudan near the French border in Bahr-el-Ghazal Province.
3. *theresae.* Three specimens, from Lake Kivu.
4. *katerae.* At present only known from the Malabigambo forest at Katera, in Buddu, Uganda, on the west coast of Lake Victoria.
5. *cabacus.* Extends from Entebbe on the north coast of Lake Victoria through the Tiriki Hills to Mt. Elgon, Cherangani, and the Mau plateau.

It is interesting that the darkest race, *katerae*, is not found on the West Coast nor in the Congo, but on the N.W. shores of Lake Victoria. The climate here is certainly very humid, the rainfall being of the order of up to 75 inches per annum, and there being no definite dry season.

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Plate 1.

Males. Upper surface.

Fig. 1. *Charaxes eudoxus eudoxus* Drury.
Regent, near Freetown, Sierra Leone. *C. A. Foster*, 1910.

2. *C. e. mechowi* Rothschild.
Belgian Congo, Basankusu, 25 miles west of Bongandanga, Bafaka. *Miss G. Vinall*, 26 June, 1929.

3. *C. e. cabacus* Jordan.
Lake Victoria, N.E. shore, Tiriki Hills, 20 miles north of Kisumu, 5100 feet. *C. A. Wiggins*, 1 March, 1903.

4. *C. e. cabacus* ab. *amaurus* Poulton. Holotype.
Kenya Colony, eastern slopes of Mt. Elgon, west of Kitale, 6–7000 ft. *V. G. L. van Someren*, 24 April, 1924.

5. *C. e. katerae* subsp. n. Holotype.
Uganda, N.W. shore of Lake Victoria, Buddu coast, Malabigambo forest, Katera, c. 4000 ft. *T. H. E. Jackson*, October, 1935.

6. *C. fallax* Richelmann.
Cameroons, Ja River, Bitje, 2000 ft. *G. L. Bates*. In British Museum ex Bethune-Baker collection.

Specimens 1 to 5 are in the Hope Department of Entomology, University Museum, Oxford.

Plate 2.

Males. Under surfaces.

Figs. 1a to 6a. Data as for corresponding numbers in Plate 1. The same specimens.

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Males of *Charaxes*.

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Males of *Charaxes*.

PLATE 3.

Females. Upper surfaces.

FIG. 7. *Charaxes eudoxus eudoxus* Drury. Neallotype.
Data as for 1.
8. *C. e. mechowi* Rothschild.
Angola. In British Museum ex Joicey collection.
9. *C. e. mechowi*. Neallotype.
Belgian Congo, Katanga, Kangazi. Coll. Le Moult. In the collection of Mr. John Levick, Birmingham.
10. *C. e. cabacus* Jordan. Neallotype.
Kenya Colony, Mt. Elgon. *T. H. E. Jackson*, August, 1932.
11. *C. e. cabacus* ab. *amaurus* Poulton. Neallotype.
Data as for 4.
12. *C. e. katerae* subsp. n. Paratype.
Data as for 5. In the collection of Mr. T. H. E. Jackson of Kitale.

Nos. 7, 10, 11 are in the Hope Department of Entomology in the University Museum, Oxford.

PLATE 4.

Females. Under surfaces.

FIGS. 7A to 12A. Data as for corresponding numbers on Plate 3. The same specimens.

PLATE 5.

Charaxes eudoxus theresae Le Cerf.

FIG. 1. ♂ Holotype.
Eastern Belgian Congo, Lake Kivu, Kitembo. Guy Babault, July, 1931.
2. ♂, transitional from *mechowi* Rthsch.
Lake Kivu, Bulira, Kitembo. Guy Babault, February, 1934.

Photographs by courtesy of Monsieur Le Cerf, Muséum national d'Histoire naturelle, Paris.

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Females of *Charaxes eudoxus*.

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Females of *Charaxes eudoxus.*

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Males of *Charaxes eudoxus*.